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The influence of perceptions of practice characteristics: An examination of agricultural best management practice adoption in two Indiana watersheds

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A B S T R A C T

Agricultural best management practices (BMPs), or conservation practices, can help reduce nonpoint source pollution from agricultural lands, as well as provide valuable wildlife habitat. There is a large literature exploring factors that lead to a producer's voluntary adoption of BMPs, but there have been inconsistent findings. Generally, this literature has not examined specific attributes of BMPs that may affect acceptability to farmers and ultimately adoption. To address these limitations, a qualitative analysis of in-depth interviews with farmers was conducted to determine which characteristics make four common BMPs more or less acceptable to agricultural producers. Interviews were conducted with forty-five producers in two watersheds in Indiana, USA. The producers were asked about their use of these conservation practices and the reasons behind their decisions. This study outlines the perceived characteristics of each conservation practice that are most important in either facilitating or impeding adoption of those practices. Results indicate that perceived high levels of relative advantage (e.g., reduced inputs, time-savings, and on-farm and environmental benefits), compatibility (with farm system and needs of producer), and observability (observing practice's advantages) are most important in increasing adoption of conservation practices. Low levels of perceived relative advantage and incompatibility of practices were found to be most important in non-adoption of conservation practices. Perceived risk and complexity associated with specific practices were only found to limit adoption for a few practices, though it was an important barrier for conservation tillage. In order to increase adoption, conservation promoters should focus on raising awareness of the on-farm and financial benefits, the environmental benefits, and compatibility of conservation practices with current farm operations.

1. Introduction

Runoff from agricultural lands in the Midwestern United States is a significant source of water pollution for both local waterways and the Gulf of Mexico (Dowd et al., 2008). Government programmes to address soil erosion for land productivity purposes have been in existence since the Dust Bowl have evolved to include financial and technical incentives for farmers to adopt a variety of practices that are intended to benefit, among other things, soil productivity, water quality and wildlife habitat (Dowd et al., 2008; Napier, 2009). Billions of dollars have been spent in recent decades to promote and incentivize the adoption of conservation practices but environmental problems still persist (Duriancik et al., 2008; Napier, 2009; Robinson and Napier, 2002).

To address this issue, numerous studies have tried to understand what motivates farmers to voluntarily adopt Best Management Practices (BMPs) or conservation practices. However, despite all these studies, there is a lack of clear evidence to help practitioners understand how to encourage more adoption. Over twenty years ago, Lockeretz wrote that "most attempts to relate farmers' conservation attitudes and behavior to personal, institutional, or farm structure variables have largely failed" (Lockeretz, 1990, p. 518). Since 1990s, little progress has been made in this direction (Knowler and Bradshaw, 2007; Prokopy et al., 2008). In this paper we argue that these studies have failed because they frequently look only at the role of producer and farm characteristics on the adoption decision. It is also important to understand how farmers view the acceptability of different types of conservation practices. This perception of acceptability is likely to be a function of producer and farm context and characteristics but is also informed by characteristics of the practices themselves. We theorize that the best

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way to understand adoption is to look at the complete picture – producer, farm and practice characteristics – to understand how each of these informs an individual's decision to adopt a particular practice. In this study we specifically examine the role of practice characteristics within this larger framework.

1.1. Modeling behavior change

An individual's decision to change a behavior is complex. A long-standing model to explain human behavior is the Theory of Planned Behavior (Ajzen, 1988); this model has recently been extended in the Reasoned Action Approach (RAA) (Fishbein and Ajzen, 2010) and has been used in earlier adoption studies to explain behavior (see, e.g., Lynne et al., 1988, 1995). According to the RAA, an individual's decision to adopt a given behavior is a function of their intent to adopt, which in turn is influenced by: 1) attitudes toward the behavior; 2) subjective and descriptive norms; and 3) perceived behavioral control. These three main drivers have varying levels of influence depending upon the behavior being adopted. These three drivers are informed by an individual's beliefs which stem from numerous sources and are, in part, a function of an individual's characteristics and past experiences (referred to as background factors in the RAA). This model is summarized in the left- and right-hand sides of Fig. 1.

These background factors have been explored in numerous studies on conservation practice adoption and have been summarized in Knowler and Bradshaw (2007) and Prokopy et al. (2008). These recent reviews of the BMP adoption literature found few variables that universally influence adoption. These background factors can generally be divided into two categories: 1) characteristics of the farmer, such as age, education and experience, and 2) characteristics of the farm, such as farm size, tenure, and soil quality. Several of these factors are included for illustration purposes in the left hand box in Fig. 1, but this list is not intended to be exhaustive. The larger context in which a farm operates may influence adoption decisions as well, including the availability of government funds, biophysical and social watershed characteristics, past outreach, and commodity prices. All of these background factors have indirect effects on adoption behavior by influencing the perceived practice characteristics, which in turn influence behavioral, normative, and control beliefs (see Fig. 1).

In the RAA, it is argued that general attitudes will usually only have an indirect affect on behavior, although these types of attitudes are included in a number of adoption studies. Rather, specific salient attitudes related to the specific practice being considered within a specific context are expected to influence behavior. These attitudes are informed by beliefs about the positive and negative aspects of the behavior (behavioral beliefs box in Fig. 1). Here the RAA starts to overlap with Rogers' (2003) diffusion of innovations theory. In this theory, Rogers posits that there are five characteristics of innovations that affect adoption or rejection: relative advantage, compatibility, complexity, trialability, and observability. The same characteristics were identified in a Barr and Cary (2000) study describing the important attributes of sustainable agricultural practices that make them more or less acceptable to landowners. Cary et al. (2001) named Rogers' five attributes plus the attribute of risk "the forgotten focus" in the adoption of sustainable practices. These concepts have also separately appeared in other studies on BMP adoption (e.g., Alonge and Martin, 1995; Gamon et al., 1994; Gamon and Scofield, 1998; Guerin and Guerin, 1994; Marra et al., 2003; Sattler and Nagel, 2010). Adesina and Zinnah (1993) state that omission of technology-specific characteristics in adoption models may bias the results of studies seeking to understand the adoption decisions of agricultural producers.

1.2. Acceptability characteristics

While others have combined acceptability characteristics (see, e.g., Pannell et al., 2006), we chose in this study to follow Rogers' original categories. The characteristic of relative advantage "is the degree to which an innovation is perceived as being better than the idea it supersedes" (Rogers, 2003). This is traditionally interpreted in terms of financial advantage to the farm business but can also consist of other types of positive impacts resulting from adoption. Many researchers have found economic factors important in affecting adoption (e.g., Carboni and Napier, 1993; Fuglie and Kascak, 2001; McCann et al., 2006). Reviewing the history of farm innovation adoption, Barr and Cary (1992) conclude that environmental innovations that are believed to be profitable are usually readily adopted, while those with a net financial cost are rarely adopted. Beyond direct economic gains, additional benefits can include an increase in social prestige, time-savings, reduction of discomfort, and immediacy of the rewards from the innovation (Rogers, 2003). The relative environmental advantages of a practice have also been found to be important. Some environmentally friendly innovations are adopted even if they are considered unprofitable (Nowak, 1983). There is evidence that individual characteristics will influence perceptions of relative advantage –

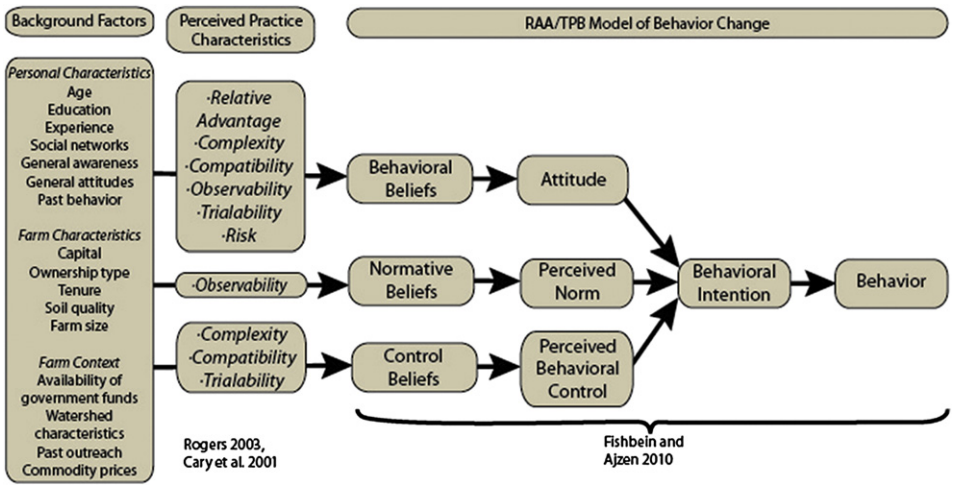

Fig. 1. Examining the role of practice characteristics in influencing the decision to adopt through the lens of the Theory of Planned Behavior/Reasoned Action Approach.